Continuous biatrial pacing to prevent early recurrence of atrial fibrillation after the Maze procedure

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Objective: It has been suggested that overdrive biatrial pacing may prevent the recurrence of atrial fibrillation after the Maze procedure. To further evaluate this hypothesis, we performed a randomized prospective study in 100 patients undergoing valve surgery concomitant with a full Maze procedure to determine the effectiveness of biatrial pacing in the postoperative period to reduce early recurrence of atrial fibrillation.

Method: Between January 2002 and December 2008, 100 patients undergoing mitral valve ± tricuspid valve surgery concomitant with the Maze procedure were randomized into 2 equal groups: the study group using overdrive biatrial pacing and a control group without pacing. One pacing wire was attached to the crista terminalis area of the right atrium, and the other pacing wire was attached to the Bachmann's bundle area located in the roof of the left atrium. The atria were paced continuously in AAI mode at a rate of 80 pulses per minute or 10 pulses above the underlying rate for 5 days. The end points were the onset of recurrent atrial fibrillation or discharge.

Results: The incidence of recurrent postoperative atrial fibrillation was significantly less in the study group, with 6 of 50 patients (12%) incurring atrial fibrillation compared with 18 of 50 patients (36%) in the control group ($P < .01$). The length of hospital stay was significantly reduced in the study group ($P < .01$), and the mean costs of hospital stay were significantly lower in the control group ($P < .05$).

Conclusions: Biatrial overdrive pacing is well tolerated and more effective in preventing the early recurrence of atrial fibrillation after the Maze procedure. This therapy also results in shortened hospital stays and decreased hospital costs. However, the impacts of the long-term results in the Maze procedure require further study. (J Thorac Cardiovasc Surg 2011;142:989-94)

Early postoperative recurrent atrial fibrillation (AF) is the most common clinically encountered arrhythmia after mitral valve surgery concomitant with the Maze procedure. Up to 43% of the cases present with AF during postoperative days 2 to 5.[1-4] These tachyarrhythmias are recognized as a major cause of perioperative morbidity and can cause hypotension, congestive heart failure, and significant symptoms, including palpitations and shortness of breath. Moreover, the management of these arrhythmias has been shown to significantly extend the length of hospitalization and associated cost.[5-7] Pharmacologic control is the first line of therapy for AF; however, it may be associated with low success rates, high recurrence rates, or patient intolerance. Thus, there is considerable interest in nonpharmacologic therapy as a way to maintain sinus rhythm. Continuous overdrive biatrial pacing was found to be effective in promoting sinus rhythm and reducing the incidence of AF after open surgery.[6,7]

The pathogenesis of early postoperative recurrent AF remains unclear and is presumably multifactorial. The mechanism of these tachyarrhythmias may be different from that of other preoperative AF. A variety of abnormalities of atrial electrophysiology are found in patients susceptible to recurrent AF in addition to incomplete ablation during the Maze procedure.[8,9] In particular, interatrial conduction block due to ablation results in delayed activation of the atria. Atrial inflammatory response, atrial ischemia during surgery, atrial premature complexes, and sinus bradycardia all play a major role in triggering AF.[10,11]

This prospective study evaluated the efficacy of biatrial pacing as a prophylactic measure against early recurrent AF after the Maze procedure when compared with no (control) or single-site atrial pacing in the right atrium. The impact of therapy on length of hospitalization was also examined.

PATIENTS AND METHODS

After institutional review board and ethical research committee approval, 100 patients from January 2002 to December 2008 undergoing mitral valve ± tricuspid valve surgery concomitant with the full Maze procedure were randomized and prospectively enrolled in the study after obtaining informed consent. Patients were excluded if they had a history of pacemaker/automatic internal cardiac defibrillator or ventricular tachyarrhythmias, or if significant events developed, such as cardiogenic shock or ventricular tachyarrhythmias postoperatively.

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Disclosures: Authors have nothing to disclose with regard to commercial support.

Read at the 91st Annual Meeting of The American Association for Thoracic Surgery, Philadelphia, Pennsylvania, May 7–11, 2011.

Received for publication April 23, 2011; revisions received June 17, 2011; accepted for publication July 11, 2011; available ahead of print Aug 24, 2011.

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0022-5223/$36.00

doi:10.1016/j.jtcvs.2011.07.018

Abbreviation and Acronym
AF = atrial fibrillation

All patients underwent the Cox Maze IV procedure for AF. All procedures were performed during cardiopulmonary bypass. Pulmonary veins were isolated with the bipolar radiofrequency clamp. Left atrial connecting lesions were created with the AtriCure bipolar clamp (Cincinnati, Ohio) by opening the left atrium and placing 1 jaw on the endocardium and 1 jaw on the epicardium. The "Box" lesion set was carried out for the entire left atrial wall. At the tricuspid and mitral valve annuli, cryoablation was used in all cases. The coronary sinus was ablated with bipolar clamp and cryoablation. The left atrial appendage was excised in all patients. The right atrial lesion set was performed on the beating heart. Biatrial reduction with a reef imbricate suture technique concomitant with the Maze procedure was performed if the left atrial diameter was greater than 65 mm. The following methods of assessment were used: Left atrial dimensions were measured by transesophageal echocardiogram or transthoracic echocardiogram, and left atrial wall thickness was measured by transesophageal echocardiogram and manually during surgery. Pulmonary artery pressures were measured by pulmonary artery catheter or transthoracic echocardiogram. Serum B-type natriuretic peptide levels were measured pre- and postoperatively. The severity of tricuspid regurgitation was classified as 0 (none), 1 (trivial), 2 (mild), 3 (moderate), 3.5 (moderate-severe), or 4 (severe) by 2-dimensional and Doppler echocardiographic evaluation preoperatively, postoperatively, at discharge, at 6 months, and at 1 year (Table 1).

After completion of valve surgery concomitant with the Maze procedure and with the heart in junctional rhythm or sinus rhythm, Bipolar pacing wires (Bipolar Coaxial 6495; Medtronic, Inc, Minneapolis, Minn) were attached to each atrium. One wire was attached to the crista terminalis area of the right atrium, and the other wire was attached to the Bachmann's bundle area, which is located in the roof of the left atrium just behind the superior vena cava and aorta. The dark pins from both atrial bipolar wires were assigned as the anode, and the white pin from the left atrial bipolar wire was assigned as the cathode. The pacing and sensing thresholds were tested during and after surgery. The external temporary pacemaker (Medtronic dual-chamber temporary pacemaker model 5388; Medtronic, Inc) was then programmed to AAI mode. The rate was set at 80 pulses per minute or 10 pulses above resting rate, to a maximum of 120 pulses per minute. The pacing protocol started with output programmed at 3 times the capture thresholds. Sensitivity was set at 1 mV. Serum potassium levels were maintained between 4.5 and 5.0 $mmol/L^{-1}$. Overdrive pacing was continued for 5 days with continuous telemetry monitoring. The pacing and sensing thresholds were checked daily, and the output was adjusted accordingly. The 12-lead electrocardiogram was performed daily for 5 days at baseline and during pacing. The pacing wires were removed by simple transcutaneous retraction by day 6 in the absence of a clinical end point. The primary end point was AF lasting more than 10 minutes or the requirement for urgent intervention because the patient became symptomatic or hemodynamically unstable.

After the operation, all patients were monitored continuously for arrhythmias. All patients received an intraoperative intravenous loading dose of amiodarone (150 mg) followed by a 12-hour postoperative infusion, aggressive postoperative diuresis, and intravenous administration of nesiritide. On endotracheal tube removal, oral amiodarone of 400 mg twice daily and sildenafil citrate (Viagra; Pfizer Inc, New York, NY) 50 mg daily were administered as tolerated and continued until hospital discharge. Electrical cardioversion was performed before hospital discharge in any patient who was not in normal sinus rhythm. Oral amiodarone 200 mg twice daily and Viagra 25 mg daily were continued for 3 to 6 months after hospital discharge. If a patient was unable to tolerate amiodarone postoperatively, then sotalol was used for the same duration. All patients in the study group underwent overdrive biatrial pacing throughout their hospitalization, and the end points were the onset of recurrent AF or discharge.

Anticoagulation therapy was determined by the valve surgery performed and the postoperative left atrial diameter. If a mechanical prosthesis was implanted, warfarin therapy was initiated on the third postoperative day and continued permanently. For patients with a postoperative left atrial diameter greater than 60 mm, anticoagulation with warfarin was used for the first 3 postoperative months.

All values are expressed as the mean ± standard deviation. Statistical analysis comparing the data between the 2 groups was performed with the chi-square test for categoric variables. Continuous variables were compared using the Student *t* test and Wilcoxon rank-sum test where appropriate. Data collected were analyzed using the Number Cruncher Statistical Systems software (NCSS, Kaysville, Utah).

RESULTS

The study population included 100 patients (44 male and 56 female) with a mean age of 55 ± 8.9 years. The mean duration of AF was 48.4 ± 21.4 months. The preoperative mean atrial size was 64 ± 12 mm. The baseline characteristics of both groups are compared in Table 1. There were no statistically significant differences in any of the parameters. Operative data of both groups are shown in Table 2. Again, there were no statistically significant differences between the 2 groups.

Early recurrent AF after the Maze procedure developed in 24 patients, with an overall incidence of 24%. Six (12%) of these patients were in the study group, and 18 (36%) of these patients were in the control group. The incidence of postoperative recurrence of AF was significantly less in the study group: 6 (12%) of 50 patients compared with 18 (36%) in the control group ($P < .01$). The peak incidence of early postoperative AF occurred within the first 4 postoperative days. The first postoperative episode of AF occurred 2.1 ± 1.3 days after surgery in the control group and 2.8 ± 0.7 days after surgery in the study group ($P < .05$). The mean duration of AF was 12 ± 1.2 hours in the study group and 18 ± 1.6 hours in the control group ($P < .01$). If AF was not converted spontaneously to sinus rhythm in 48 hours, pharmacologic means or electrical cardioversion was used to restore sinus rhythm before discharge.

A progressive increase in pacing thresholds and a decrease in atrial sensing amplitude occurred with time, but adequate pacing was possible in all patients during the study period. Atrial pacing was discontinued prematurely in 2 patients (4%) of the study group because of diaphragmatic pacing. One patient (2%) in the study group required open pericardial drainage because of cardiac tamponade after removal of the epicardial pacing wires.

The mean length of hospital stay was 7.4 ± 2.7 days; the median stay was 5.2 days. The length of hospital stay was significantly reduced in the study group (6.1 ± 1.2 days vs 8.7 ± 4.1 days in the control group; $P < .01$). The mean length of stay in the intensive care unit was also significantly reduced in the study group (2.1 ± 0.6 days vs 3.6 ± 2.5 days in the control group; $P < .05$). The median

TABLE 1. Patient demographics

Characteristic	Biatrial pacing	Control group	Total value	*P* value
Patient (N)	50	50	100	
M/F	21/29	23/27	—	NS
Age, y	56 ± 10.4	54 ± 7.3	—	NS
NYHA class	2.1 ± 0.7	2.3 ± 0.9	—	NS
History of stroke, n (%)	2 (4%)	1 (4%)	—	NS
Atrial appendage clot	6	4	10	NS
Mitral stenosis and insufficiency	44	46	90	NS
Mitral insufficiency	6	4	10	NS
Aortic stenosis and insufficiency	11	14	25	NS
Tricuspid insufficiency	36	38	74	NS
Ejection fraction	48 ± 8	46 ± 11	—	NS
Duration of AF (mo)	51 ± 23	47 ± 19	—	NS
Left atrial diameter (mm)	67 ± 13	61 ± 11	—	NS

NYHA, New York Heart Association; *NS,* not significant.

TABLE 2. Distribution of operative procedures

Procedure	Biatrial pacing	Control group	Total (%)
MVR only	6	4	10 (10)
MVR only	10	9	19 (19)
MVR + TV repair	34	37	71 (71)
MVR + TV repair + LAR	24	21	45 (45)
MVR + TV repair + late	4	6	10 (10)
MVR + TV repair + AVR	11	14	25 (25)
MVR + TV repair + PFOC	2	7	9 (9)

MVR, Mitral valve repair; *TV,* tricuspid valve; *LAR,* left atrial roof; *AVR,* aortic valve repair; *PFOC,* patent foramen ovale closure.

hospital charges in the study group were significantly reduced by 14% compared with the median charges in the control group ($P < .05$).

DISCUSSION

The pathogenesis of early postoperative recurrent AF remains unclear and is presumably multifactorial, but the mechanism of early postoperative recurrent AF may be different from that of preoperative AF. The increased dispersion of atrial refractoriness is one proposed mechanism that facilitates the initiation of reentry in the atria after the Maze procedure. Previous animal studies demonstrated that dispersion of refractoriness and anisotropic conduction are 2 essential elements for sustaining atrial arrhythmia,[12,13] and both have been implicated in the pathogenesis of postoperative AF. The Maze procedure requires extensive ablation, incision, and suture lines on both atria, causing interatrial conduction block, atrial inflammatory response, atrial ischemia, atrial premature complexes, and sinus brandycardia.[14] These multiple atrial ablations likely cause a robust inflammatory response and may contribute not only to abnormal refractoriness but also to an increased frequency of triggering events. The slow conduction in either atrium with subsequent retrograde activation resulted in greatly delayed and inhomogeneous activation of the contralateral atrium and major intraatrial and interatrial asynchrony with prolonged regional refractoriness.

This study demonstrated that biatrial overdrive pacing can prolong arrhythmia-free intervals in patients with drug-refractory AF after the Maze procedure. The antiarrhythmic effects of biatrial pacing may be explained by several different electrophysiologic mechanisms as follows: (1) Biatrial overdrive pacing at a higher rate can suppress bradycardia-induced irregular heart rate and may reduce the dispersion of refractory periods. (2) Biatrial overdrive suppression of atrial premature beats may contribute to AF prevention through suppression of automatic foci. (3) Biatrial overdrive pacing corrects asynchrony and nonuniform activation resulting from organic or functional blocks, thereby improving local excitability and reducing the window opportunity for AF initiation.[10,11]

All patients undergoing the Maze procedure with preoperative AF usually presented with long duration and had already developed the appropriate substrate required to sustain this arrhythmia. In patients with giant atria, failure to anatomically isolate the entire posterior left atrium, and severe atrial myocardial fibrosis, early postoperative recurrent AF was considered to be continuation of preoperative AF. Biatrial overdrive pacing for this group of patients is not effective.[2,15]

The failure of biatrial overdrive pacing to prevent AF after cardiac surgery has been reported.[16] One of the possible reasons was failure of the temporary pacemaker to sense the atrial electrical activity leading to asynchronous pacing of the atria. This may directly relate to temporary pacing wire dysfunction or inappropriate site placement of pacing wire.[17] This study demonstrated that the left atrial Bachmann's bundle area and right atrial crista terminalis area are suitable sites to attach the temporary pacing wires. They decreased in pacing thresholds and increased in atrial sensing amplitude. One possible explanation may be analogous to optimizing the capture and depolarization of the largest volume of atrial myocardium within the shortest possible time.

In patients undergoing coronary artery bypass surgery, many observational studies have investigated the timing of the onset of early postoperative recurrent AF.[8,18] Those studies showed that the peak incidence of AF is on postoperative day 2 after coronary artery bypass surgery. In contrast, the incidence of onset of early postoperative recurrent AF was later (postoperative day 4) in patients after the Maze procedure. Therefore, the incidence of postoperative recurrent AF significantly lengthened the hospital stay after the Maze procedure. The increased costs associated with the development of postoperative AF are mainly due to prolongation of hospital stay. In our study, hospital stay and hospital costs were significantly

reduced by biatrial pacing compared with single-site or no pacing groups.

The biatrial pacing technique was not associated with side effects. Identifying patients at risk for developing early postoperative recurrent AF and using biatrial pacing may be the optimal cost-effective strategy. At the present time, it is not possible to accurately predict early postoperative recurrent AF after the Maze procedure; therefore, we recommend prophylactic biatrial pacing in all patients undergoing Maze surgery. Damiano and colleagues[15] recently reported the predictors of late recurrence for patients undergoing Maze surgery and demonstrated 3 risk factors for recurrent atrial tachyarrhythmias after the Maze procedure using multivariate logistic regression analysis. These include left atrial size, failure to anatomically isolate the entire posterior left atrium, and early atrial tachyarrhythmias. An early aggressive attempt to prevent early atrial tachyarrhythmias would improve late success. This study demonstrated the pharmacologic control, and biatrial overdrive pacing may be the ideal prophylactic approach to prevent early postoperative recurrent AF. We were unable to investigate the impacts of long-term results, and further study needs to be conducted.

CONCLUSIONS

Biatrial overdrive pacing is well tolerated and more effective in preventing the early recurrence of AF after the Maze procedure. This therapy also results in shortened hospital stays and decreased hospital costs. The impacts of the long-term results for the Maze procedure require further study.

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Discussion

Dr Michael Argenziano *(New York, NY).* This was a study of 100 patients over 6 years who were randomized between 2 postoperative management protocols after a Maze procedure, which was done in combination with a variety of other concomitant procedures. As far as I can tell from the article, the 2 groups were reasonably well matched demographically, although one criticism of the article is that there were no *P* values shown for the comparisons of preoperative risk factors in the 2 groups, which I think would be an improvement.

Biatrial pacing as shown here, in what has to be considered an intent-to-treat analysis, did result in a lower incidence of perioperative AF, defined as lasting more than 10 minutes in the first 5 to 6 days after surgery. A variety of novel and not so novel interventions have been tried over the last decade or more to try to prevent perioperative AF. A number of postoperative pacing protocols and other pharmacologic approaches, including oral loading of amiodarone up to 1 week before surgery and even posterior pericardiotomy, have been attempted to try to minimize this important and costly complication. Most of these interventions have suffered because of the complexity and difficulty of performing them in everyday practice.

So one criticism I guess that the authors need to be prepared to defend is the fact that, according to this protocol, patients were kept in the hospital on atrial pacing for at least 5 days, and then, really, those wires couldn't be removed until the sixth day, which would complicate issues, such as dealing with anticoagulation, are the chest tubes out already, and so forth. So that is obviously one criticism.

The other issue is whether the definition of freedom from AF in only 6 or 7 days is relevant to anything. In other words, if you have shown that your patient is free of AF at 6 days, does that predict whether the patient is going to be free of AF at 10 days or 3 weeks? Do we have enough confidence that the patient who is not in AF at 6 days has a low risk of developing AF over the next few weeks, as we know often happens, and are we confident enough to avoid anticoagulating that patient? Those are general criticisms.

My questions are the following. First, how many of your patients in each group were in sinus rhythm or some sort of a paceable rhythm in the operating room after the procedure? Because obviously, of the 50 patients in each group, some were not eligible for pacing because they were not paceable or were in AF.

The second question I have is that you gave amiodarone to everyone in the study, and it was a pretty aggressive load, an intravenous load followed by an oral protocol. Of course, what we found at our center is that if you do that, a fair number of patients become bradycardic in the perioperative period. So I would imagine that a number of the patients in your control group actually received atrial pacing, single-site pacing, as you described it. So I would like to know how many of the 50 in the control group actually received single-site pacing?

Finally, have you followed your patients beyond the initial perioperative period? Because what I think would be helpful from this patient cohort, which represents an outstanding randomized trial, is to see whether these interventions actually affect their AF incidence at 1 month and beyond.

Dr Wang. That is a good question. If you do more than 200, maybe 300 full Maze procedures during the last 5 years for AF, I think you will notice the surgical results make you a little bit crazy. The results are not predictable, but right now we are a bit smarter. If one patient presents with a 5- to 10-year history of AF and a left atrial diameter of more than 8 cm, before we start cardiopulmonary bypass, we routinely convert these patients. If we shock 3 times, we cannot convert. What I tell myself is that it is going to be difficult to maintain the sinus rhythm in this patient.

To answer your first question regarding the sinus rhythm in the operating room, from my experience, the majority of the patients in the operating room are not in sinus rhythm, maybe 5% or 10%. The majority of patients are in junctional rhythm, which is why we started pacing in the operating room with the biatrial overdrive pacing.

You are right about anticoagulation. There are 50 patients in China (25 in a control group and 25 in a study group), and the patients routinely receive a mechanical valve. You have to start Coumadin on postoperative day 2. So we discontinue the chest tube on postoperative day 2 or 3 and keep the pacing wire there. Usually we do not pull the pacing wire, and we routinely cut it. In 1 patient, we tried to pull the pacing wire and had a tamponade, and we had to go back to relieve the tamponade.

The answer to the third question is long-term results. Yes, Dr Damiano is here. I agree with him about the long-term results. Early recurrence of AF after a Maze procedure may affect the long-term results. Yes, we have followed up these 100 patients with biatrial pacing for approximately 3 years and plan to report the results at next year's American Association for Thoracic Surgery annual meeting. Last year, I published an article in the *European Journal of Cardiothoracic Surgery* and reported 2 years of results in 322 patients with permanent AF and biatrial enlargement undergoing the Maze procedure with biatrial reduction. We have followed up a group of patients for 3 to 5 years to see what the long-term results are.

Dr Claudio Muneretto *(Brescia, Italy).* My question arises from previous experience with electrophysiology in which the overdrive of ectopic atrial beat was effective in preventing paroxysmal AF, but, unfortunately, significantly increased the rate of atrial flutter and atypical atrial tachycardia. What about the incidence that you had in your series of atrial flutter and atypical atrial tachycardia? Were there any differences among the groups in the incidence of atrial flutter?

Dr Wang. Very interesting. I think my series is somewhat different. We did not observe any high incidence of atrial flutter, because we did the full Maze procedure, which is the left pulmonary vein epicardial isolation, and actually did the entire left atrial posterior wall ablation, appendage amputation, and left pulmonary veins epicardial-endocardial longitudinal ablation. In the meantime, we go back to the right atrium and do a full ablation with cryo for the right isthmus area. We didn't observe atrial flutter in our patients.

Dr Ralph Damiano *(St. Louis, Mo).* This is certainly a promising therapy, and others have shown that biatrial pacing was effective for other types of postoperative AF. My first question is what you called a Maze procedure. This term has been misused over the last 10 years. Was this a standard biatrial Maze procedure with a full biatrial lesion set or did you perform a variant of the Maze procedure?

Dr Wang. No. We do a full biatrial Maze procedure, plus if the patient's left atrium is more than 6.5 cm, we routinely do a roof implicate, left atrium reduction.

Dr Damiano. Do you need to do biatrial overdrive pacing? Have you looked at just using right atrial overdrive pacing and would that be as effective?

Dr Wang. Before we started this protocol, we tried to use only right biatrial pacing, but in most of the patients we abandoned it, because on day 3 or 4, the patient was back to AF; you cannot pace or the pacing cannot capture.

Dr Damiano. That leads to my next question. Because you did do a biatrial Maze, which we certainly have had a lot of experience with also, the majority, as you said, of those patients initially are in junctional rhythm. It has been our experience that with a big load of amiodarone, which you are using, patients tend to remain in junctional rhythm. Our protocol is different now. We do not even start the amiodarone until they regain sinus rhythm, which often can take 3 to 4 days. We certainly have patients we never treat with antiarrhythmic drugs. In your cohort at 5 days, when you stop pacing, how many patients were in a junctional or bradycardic rhythm and did that influence your management?

Dr Wang. This group of patients received amiodarone preoperatively. So after surgery, we routinely resume the amiodarone. We did not experience any high incidence of bradycardic rhythm in this group of patients. If the patient is 60 above or 70 beats/min, we just discharge the patient and reduce the amiodarone dosage. There are patients who have been taking amiodarone for 3 or 6 months. So I don't know whether the effect with amiodarone can cause the bradycardia or not. We didn't have too many patients with bradycardia.

Dr Damiano. What percent of patients ended up with permanent pacemakers?

Dr Wang. Probably 3%, even less.

Dr G. Hossein Almassi *(Milwaukee, Wis).* Could you clarify in terms of the pacing wires that you used in the Bachmann's bundle and the right atrium, did you use unipolar pacing, and if so, how many wires per site did you use, or did you use bipolar wires? Your slide suggested that you used unipolar wires. Is that accurate?

Dr Wang. Bipolar wire. The one wire on the left atrium between the ascending aorta and SVC area. We put 2 small sutures there. We cut it. We didn't pull out.

Dr Almassi. So is it a bipolar wire that you are using?

Dr Wang. Bipolar pacing wire from Medtronic, Inc (Minneapolis, Minn).

Dr Almassi. Therefore, if you are using a bipolar wire at the Bachmann's bundle, which is the preferred site for me for single atrial pacing in all my patients, and then you use 1 wire on the right atrium, basically you are using 2 wires, and with the distance between them, I am not sure how bipolarity is going to occur and how you could call it biatrial pacing versus putting 2 wires at each site and then syncing into your pacing box through a different cable to pace them.

Dr Wang. We put a left temporary pacing wire in the left Bachmann's bundle area and a right pacing wire in the right crista terminalis area.

Dr Almassi. Which site is going to be positive, and which site is going to be negative?

Dr Wang. The left atrial pacing wire is positive, and the right atrial pacing wire is negative.

Dr Ottavio Alfieri *(Milan, Italy).* Do you think there is a rationale for using biatrial pacing in patients undergoing operation without the Maze?

Dr Wang. Since I did something in China for the 50 patients, I got a pretty good idea. If the patient is aged less than 50 years, biatrial pacing is fine for 6 days. At the 1- or 3-month follow-up, they are probably staying in sinus rhythm. But if the patient is aged more than 60 years and has a long history of AF, no matter what you do, they are still back to the AF. But right now, the cardioversion is postponed. If during the hospitalization the patient has AF, we are going to convert once. If the patient is still back to the AF, we postpone 1 month and ask the patient to come back to convert at that time.